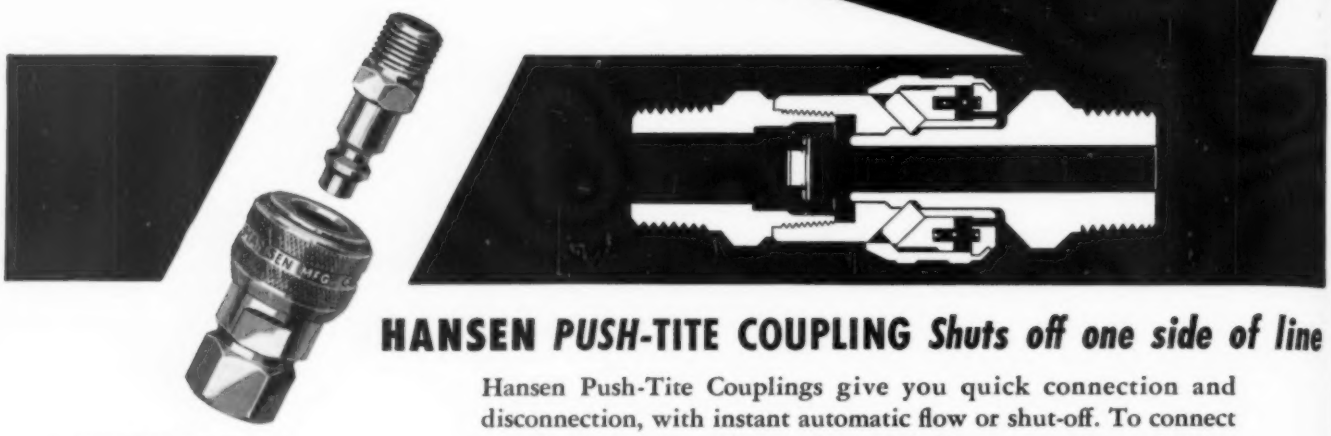
Applied HYDRAULICS

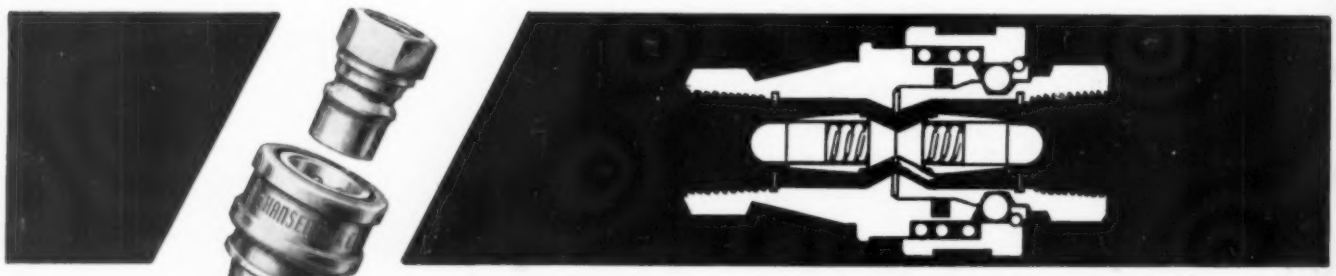
HANSEN



HANSEN *PUSH*-TITE COUPLING *Shuts off one side of line*

Hansen Push-Tite Couplings give you quick connection and disconnection, with instant automatic flow or shut-off. To connect coupling, and open line to flow of fluid, you merely push plug into socket. To disconnect, a slight pull on sleeve releases plug and shuts off supply end of line. Free swiveling plug prevents hose kinks.

HANSEN PUSH-TITE COUPLING
Cross-section at upper right shows flow through coupling when connected.



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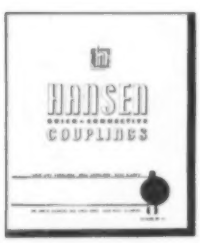

WRITE FOR CATALOG No. 47
giving descriptions and sizes of complete Hansen line of straight through and shut-off couplings for hydraulic and pneumatic connections.

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THE HANSEN MANUFACTURING COMPANY

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MARCH, 1949

Vol. 2 No. 2

Applied HYDRAULICS

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FRONT COVER: A lift truck, equipped with a double hydraulic pump for supplying power simultaneously to steering and lifting circuits, is shown stacking lumber. A story on how a saw mill resaw went hydraulic begins on page 16.

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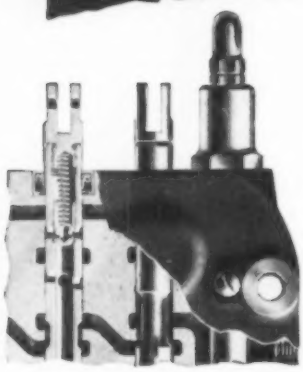

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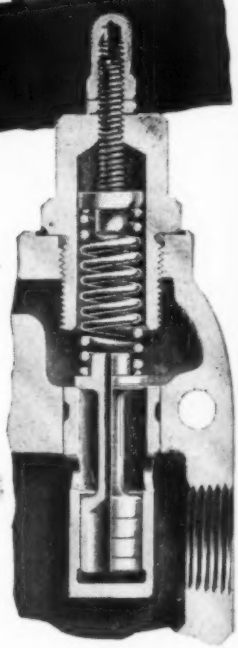

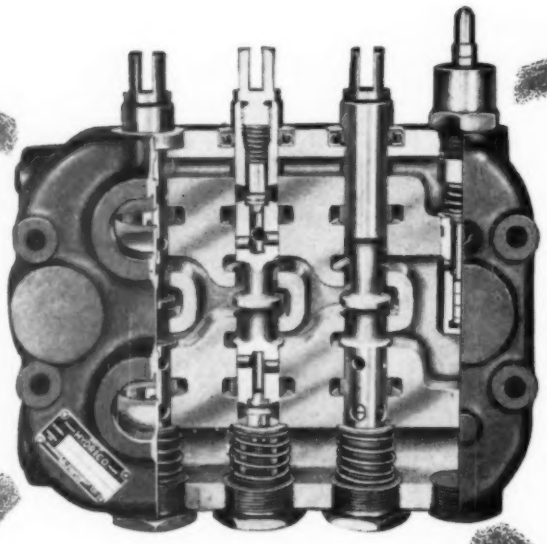

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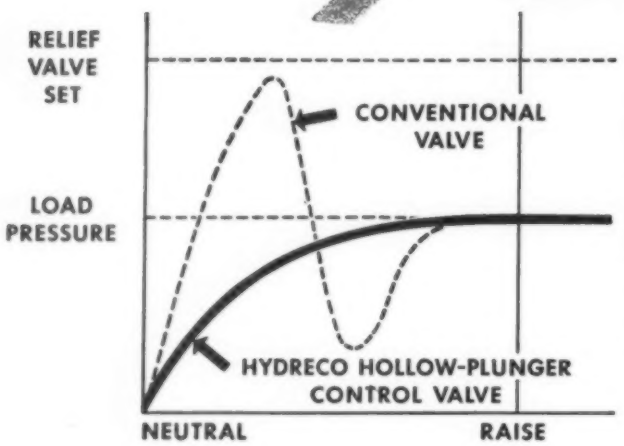

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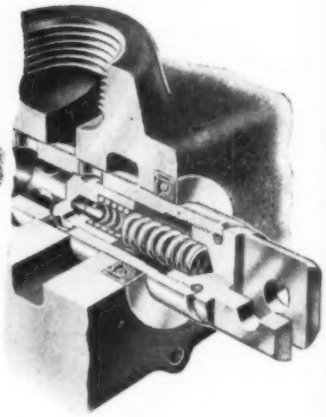

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HYDRAULIC CONTROL DEVICES
PUMPS · CYLINDERS · VALVES

An editorial on Americanism

LET'S KEEP OUR GAINS

BY W. A. PATTERSON
President
United Air Lines, Inc.

THE PRESENT hue and cry over real and imagined threats of subversive elements to the safety, security and established order of the United States must not be allowed to obscure the big responsibility which we have to keep our own house in order. Gains which we have made in strengthening our system of private enterprise must not be lost. Further advancements must be expected.

It was largely the ingenuity and productivity of our free enterprise system which won the war. The same features of our American way of doing things should constitute the best guard against any pestilences which may creep in from abroad.

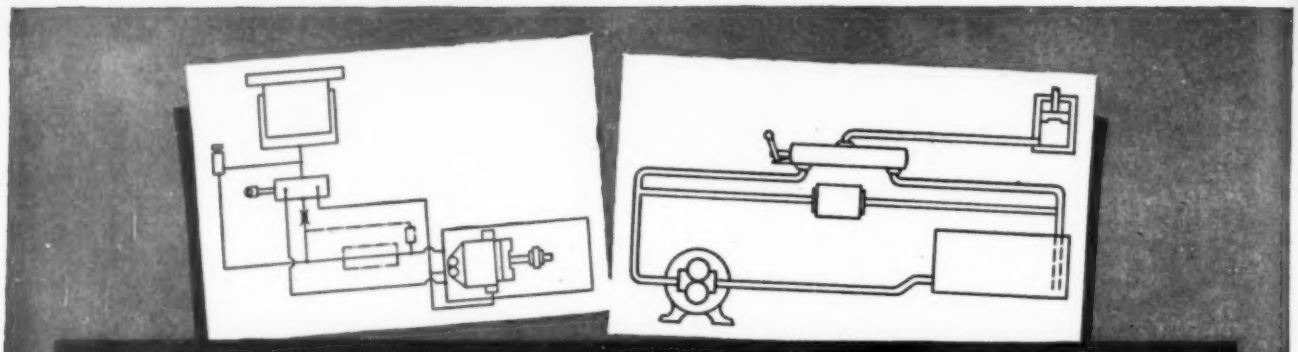
Partners in the system of private enterprise are stockholders, management, employees and patrons. Honesty and sincerity must be the basis for their ventures, large or small. Frank dealings and a free exchange of information between all parties is a major requirement.

It is because business so often has aroused suspicion on the part of stockholders, employees and customers that it has permitted politicians and factional leaders to pick up the popular banner called "social gain". Such was one reason that business forfeited so many of its prerogatives to government—prerogatives which it is only just beginning to re-gain.

Realistic efforts on the part of all business and industry to strengthen and preserve our system of free enterprise, chiefly through recognition of their social and economic responsibilities, will do far more to spike subversive threats than all the Communist hunts now under way. Without such efforts, we might as well concede victory to the "isms"—and let the atom bomb do the rest.

There have been healthy signs of a resurgence of social consciousness on the part of business; of more intelligence on the part of management and labor in their approach to mutual problems; of a relaxation of the government's tendency to run everyone and everything; of a growing consciousness on the part of the public generally as to what should constitute a sound and secure America.

We can hope that these trends will continue and that private enterprise will become an increasingly strong bulwark against those who might wish to step in and run our household for us.



A Beginner's Course in Basic Hydraulics

Part 1. Introduction

This introductory article discusses: the development of hydraulics; the advantages and problems of hydraulic set-ups; and, the physical properties of liquids. This and following installments have been selected to provide the essential facts of hydraulic principles, elements and systems for the beginner in industrial applications.

HYDRAULICS, ORIGINALLY, covered a study of the physical behavior of water at rest and in motion. Modern usage has broadened its meaning to cover the physical behavior of all liquids, including the oils commonly employed in present day fluid pressure systems.

In this course we will be concerned primarily with the phases of hydraulics incident to the actuation and control of industrial mechanisms.

History. Although the modern development of hydraulics is of comparatively recent date, the ancients were familiar with many hydraulic principles and their applications. The Egyptians and the ancient peoples of Persia, India and China conveyed water along channels for irrigation and domestic purposes, using dams and sluice gates to control the flow. The ancient Cretans had an elaborate plumbing system. Archimedes studied the laws of floating and submerged bodies. The Romans constructed aqueducts to carry water to their cities.

After the breakup of the ancient world, there were few new developments for many centuries. Then over a comparatively short period, beginning not more than three or four hundred years ago, the physical sciences began to flourish, thanks to the discovery of many new mechanical devices. The fundamental law underlying the whole science of hydraulics was discovered by Pascal in the seventeenth century. By the end of the next century ways had been found to make the snugly fitted parts required in hydraulic systems. Since then progress has been rapid.

Present day uses. Today, hydraulic tools and machines are to be found everywhere about us. In the garage, a mechanic raises the end of a car with a hydraulic jack. In service stations, hydraulic lifts are used to raise cars for chassis lubrication. Dentists and barbers call on hydraulics to lift chairs to a convenient working height by a few strokes of a small lever. Hydraulic elevators transfer merchandise in warehouses from floor to floor. Hydraulic door stops keep heavy doors from slamming (Figure 1). Fluid drives are used in some automobiles and in many buses and trucks. City water system depend upon the large

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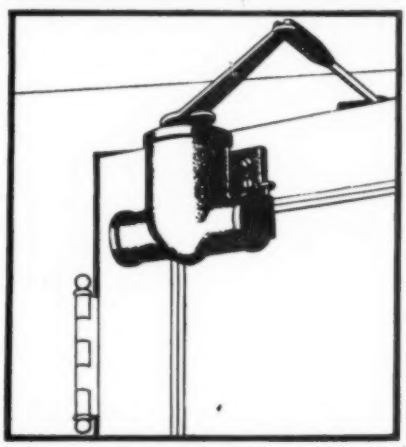

Fig. 1. The familiar hydraulic door stop or check.

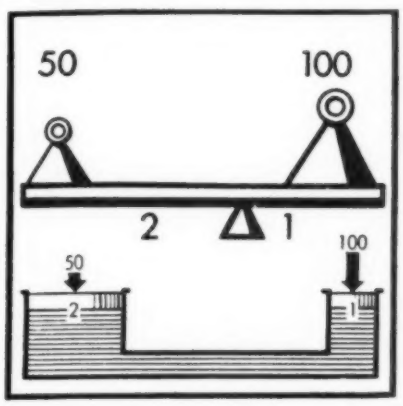

Fig. 2. Physical analogy of hydraulic force to mechanical force.

scale application of hydraulic principles.

In a comparatively short period—not over 20 years—hydraulic principles have been applied to a great range of power and control problems.

The recent war greatly accelerated the design and application progress of hydraulic elements and systems, particularly for aircraft, marine (particularly naval mechanisms), machine tools and a great variety of other automatic and sequence cycling industrial machines and equipment.

Advantages and Problems of Hydraulic Set-Ups

Advantages. The common use of hydraulic apparatus is due to the fact that properly constructed hydraulic systems possess a number of favorable characteristics. Although complex installations have been developed for special purposes, those in common use are generally simple in construction. Hydraulic systems eliminate the need for complicated systems of gears, cams and levers. Motion can be transmitted without the slack inherent in the use of all solid machine parts. The liquids used are not subject to breakage as are mechanical parts and the mechanism itself is not subject to great wear.

The different parts of a hydraulic set-up can be conveniently located at widely separated points and the forces generated rapidly transmitted over considerable distances with small loss. These forces can be carried up and down or around corners, with small losses in efficiency and no complicated mechanisms. Very large forces can be controlled by much smaller ones, and can be transmitted through comparatively small pipes and orifices.

If the system is well adapted to the work it is required to do, and if it is not misused, it can provide smooth, flexible, uniform action without vibration, unaffected by variations of load. An automatic release of pressure in case of overload can be guaranteed, so that the system can be protected against breakdown or strain. Hydraulic system can provide widely variable motions in both rotary and straight-line transmission of power. Need for control by hand can be minimized. Finally, hydraulic systems are economical to operate.

Special problems. The extreme flexibility of hydraulic elements gives rise to a number of problems. Since fluids have no shape of their own, they must be positively confined throughout the entire system and prevented from going anywhere except where we want them to go. We must give special thought to the structural organization and the relation of parts of a hydraulic system; we must provide strong pipes and containers; we must prevent leaks. This problem is acute with the high pressures used in many hydraulic installations.

The pressures set up in hydraulic systems must be controlled, as well as the movement of the component fluids. This movement causes friction within the liquid itself and against containing surfaces, which if excessive, can lead to serious losses in efficiency. Dirt must not be allowed to accumulate in the system where it will clog small passages or score nicely fitted parts. Chemical action may cause corrosion. Valves and pumps raise a variety of problems. Above all, it is necessary to know how a hydraulic system works, both in terms of the general principles common to all physical mechanisms and the peculiarities of the particular set-up at hand.

All physical science based on same principles. Although solids differ in certain ways from liquids and gases, and although every substance — lead, tin, water, oil, oxygen—has its own special properties, all kinds of matter show the same fundamental patterns of action and reaction. When the principles common to all physical science became clarified in early modern times, new possibilities of understanding and action were opened up. When a person thoroughly grasps these principles, he is in a position to enlarge his power to understand and control the natural world.

Fig. 3. (left) Transmission of force through a solid.

Fig. 4. (right) Transmission of force through a liquid.

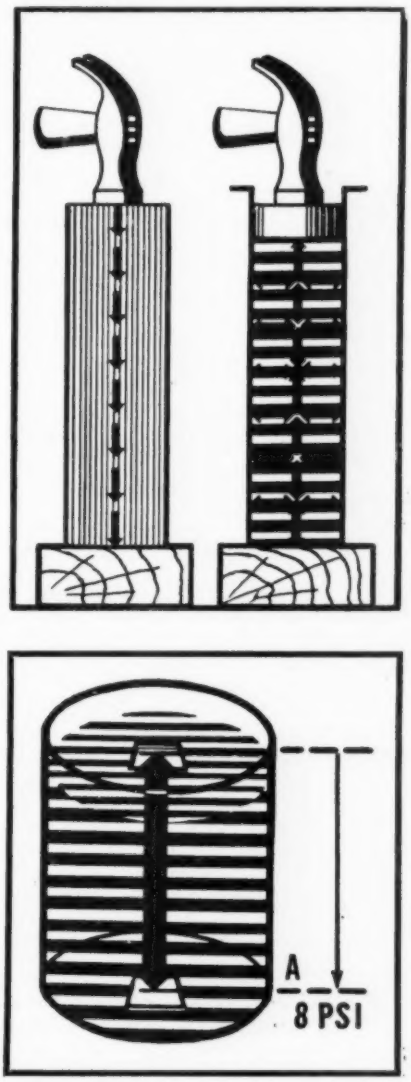

Fig. 5. Graphic representation of Pascal's law—a pressure set up in a liquid acts equally in all directions.

Thus, although solids are rigid and fluids are not, the student can apply what he knows about levers to hydraulic situations. Just as a child that weighs 50 pounds can balance another that weighs 100 pounds by sitting twice as far away from the balancing point, so in hydraulics a force of 50 pounds applied over a certain area can balance a force of 100 pounds

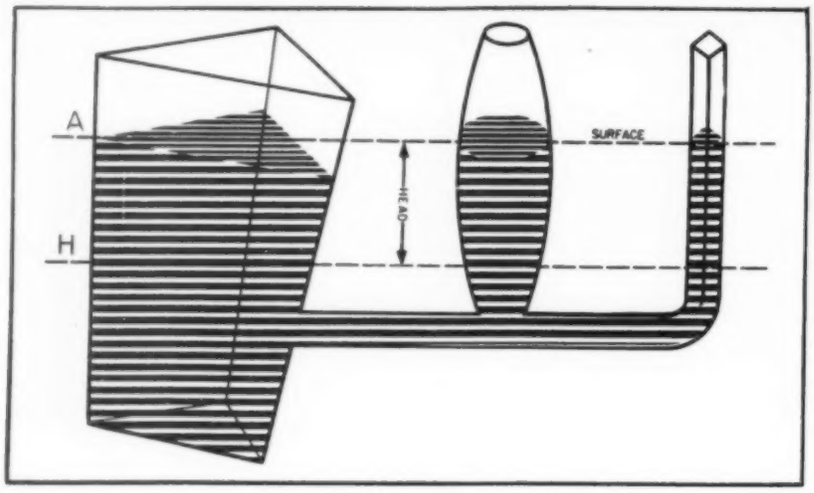

Fig. 6. The shape of a container does not alter pressure relations. The pressure due to weight at level H is identical in each column.

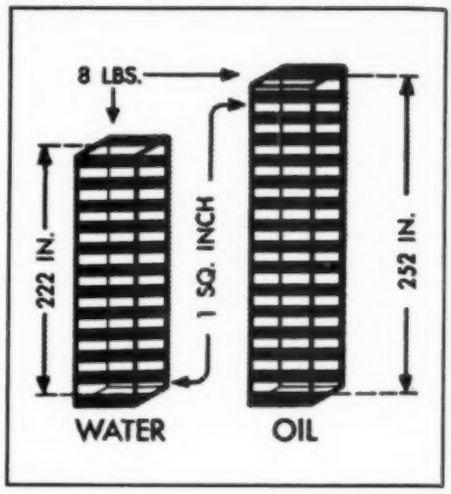

Fig. 7. The relation of density to pressure; an oil with specific gravity less than a standard substance — such as water — would require a greater head to produce the same pressure.

acting over one-half that area (Figure 2).

Different ways of doing the same thing. The inventor or engineer who wants to move something is always faced with a number of possibilities. An object to be moved might be pushed with a stick or pulled by a chain. A jet of water or a stream of air might play upon it, or something could be thrown against it. If a weight is to be lifted, he might use levers, gears, ropes and pulleys, chain hoists, screw jacks, hydraulic jacks or the force of flotation. Part of the system could make use of electricity, heat or even light, as in the case of doors that open automatically when a person approaches.

Each method of accomplishing mechanical movement has its good points and its bad, its special capabilities and limitations. Ropes and chains, for example, can pull but they cannot push; hydraulic elements can push but they cannot pull; solid rods can both pull and push but cannot go around corners like chains or ropes or hydraulic elements; gears can operate continuously in a rotary motion, whereas a lever usually operates so that the arms of the lever move back and forth. And so it goes for every machine element. Though each obeys the same general physical laws, each also possesses special properties that must be taken into account.

Physical Properties of Liquids

Shapelessness of liquids. While solids always have a definite shape, liquids have no outer form of their own. They quickly conform in shape to their containers. Because of their own shapelessness, we can lead liquids almost anywhere in a pipe or a hose by means of gravity or by applying forces to them. In case of transmission they are second only to electricity, which can go anywhere without gravitational effect and which requires only a conductor.

Incompressibility of liquids. In spite of having no shape of their own, liquids are even less compressible than most solids. When a force is applied to a confined liquid, the liquid exhibits substantially the same effect of rigidity as a solid. If an appropriate exit is provided, this effect can be combined with fluidity to transmit a force.

A force of 15 pounds on a cubic inch of water will decrease its volume by only 1/20,000. It would take a force of over 32 tons to reduce it 10 percent. Other liquids behave similarly. And when pressure on a liquid is removed, the liquid immediately returns to its former volume.

Transmission of forces through liquids. When we strike the end of a bar, the main force of the blow is carried straight through the bar to the other end (Figure 3). This happens because the bar is rigid. The direction of the blow determines almost entirely the direction of the transmitted force. The more rigid the bar, the less force is lost inside the bar or transmitted outward at right angles to the direction of the blow. When we apply a force to the end of a column of confined liquid, however, it is transmitted not only straight through to the other end but also equally and undiminished in every direction throughout the column —forwards, backwards and sideways—so that the containing vessel is literally filled with pressure (Figure 4).

For this reason a flat hose takes on a circular cross section when it is filled with water under pressure. The outward push of the water is equal in every direction. Water would leave the hose through leaks at the same velocity, no matter on what side of the hose they might happen to be.

Pascal's Law. The foundations of modern hydraulics were

(Continued on page 18)

PRESSURE LOADING

in a hydraulic pump

...provides volumetric efficiencies up to 97%!...provides torque efficiencies up to 90%!

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By REGINALD EASTON
Chief Engineer
J. P. Lewis Co.,
Beaver Falls, N.Y.

HIGH HYDRAULIC pressure is nothing new to the J. P. Lewis Company of Beaver Falls, New York. They have been engaged in the commercial use of pressure, combined with heat, in the production of paper and plastic sheet products from their own paper mill machines.

The original installation of high pressure, made about 1933, consisted of a small press, the pressure for which was supplied by a steam driven pump. Among the first paper machine plastic laminates were made with this installation.

The high pressure products made by this company are divided into two grades. The first is a low density phenolic laminated board, known as tensilite 100N, which is used in the radio industry. The board is used as a form for winding the loop antenna, and being attractive in appearance, often also serves as the radio back. This board must possess special dielectric properties, particularly the quality called "Q" in the radio industry. The less resistance in a coil, the better is its selectivity. This relative goodness or merit of the coil may be expressed by the ratio between the inductive reactance and the resistance. The symbol for this ratio is "Q".

By a technique developed at the Lewis plant, the board has a high "Q" factor as well as meeting the exacting physical requirements.

Another grade produced is a low cost phenolic laminate, known as astensilite 300, in which a series of sheets of paper, resin treated on the paper machine, are laminated by pressure and heat to a density of 1.35. The laminating press in use will produce 8-48 sheets, up to 60 in by 60 in at one operation, with a finished thickness up to two inches.

A centrifugal pump is used to close the press and after the press is closed an air top two-pressure hydraulic operating valve allows the controllable capacity triplex pump to furnish the required pressure to the ram.

In order to utilize existing equipment, a two-stage centrifugal pump is used for low pressure closing of the ram. However, any pump with 200 gpm capacity at 80 to 100 psi discharge pressure could be used satisfactorily.

The press finishes its closing movement under a maximum ram pressure of 2500 psi and a plate pressure of 800 psi.

Although similar pressures were possible with the steam pump previously used, it was not possible to vary the pressure used.

(Continued on page 26)

LETTERS *to the Editor*

In reference to A.W.K.'s letter in the January issue I am enclosing two solutions (diagrams) to his riveting problem. Although both plans are fundamentally alike there is a difference in the type of controls.

C.E.C.

Editor's comment: This information has been forwarded to A.W.K.

We have a problem of indexing a 6 to 8 station turret in which the material is fed to the tools. The materials will be fed up to the individual turret tools; operations are to be performed individually and at the end of each operation the materials will be fed back away from the turrets.

At present we have in mind a motor operated feed but would use air or hydraulic feed if possible.

Could it be worked out in a cycle, using hydraulics? The nearest comparison would be a turret hand or automatic screw machine, except that it is not a screw machine job. Could a circuit be worked out from the articles published on pages 6 and 10 of the November issue of APPLIED HYDRAULICS?

C.A.K.

We have referred this problem to the authors of the two articles in question.

Will you give us the name and address of one or more manufacturers of hydraulic starters for light diesel or heavy truck gas engines?

J.P.

The names and addresses have been sent to you.

In Mr. McCuistion's article "How to Eliminate the Problem of "O" Ring Leakage (February issue, page 20) he mentions the influence of aniline points on the expansion of "O" rings. My oil supplier does not furnish any information as to the range of aniline points on the hydraulic oils we buy. How important are aniline points?

D.N.

Answer by Mr. McCuistion:

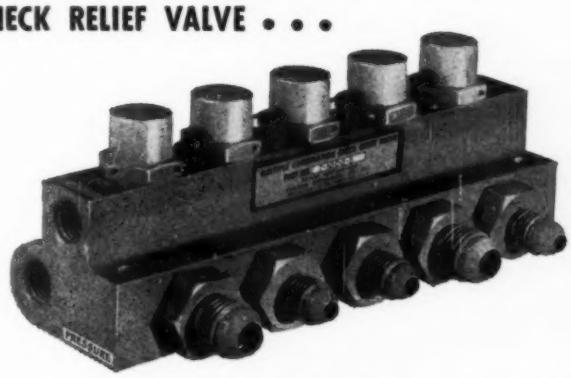
The aniline point or number of an oil is a very good indicator of the effect it will have on various synthetic materials. For example, packings, diaphragms, hose, etc. made from one type of synthetic rubber may swell excessively in low aniline point SAE 10 oil. On the other hand, the same material may shrink excessively in another SAE 10 oil which has a high aniline point.

Aniline point is the exact temperature at which a mixture of aniline and oil becomes cloudy.

The standardization and classification of hydraulic oils into various aniline ranges would greatly simplify the problem of obtaining the proper seals, hose, etc. for hydraulic devices.

Where *weight saving* is important

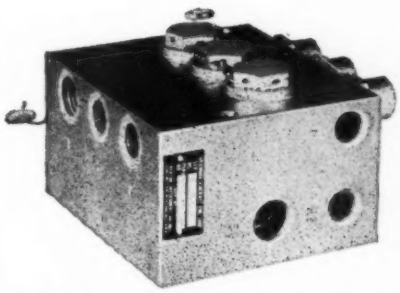
THE KENYON COMBINATION MULTIPLE CHECK RELIEF VALVE . . .



- Eliminates Tubing
- Saves Weight
- Labor Saving
- Costs Less than an equal number of valves

. . . combines several units. Relief valves to protect lines from thermal expansion, check valves to prevent interflow in five or more hydraulic sub-systems.

Compact and precision made, it eliminates many feet of tubing, saves weight, minimizes leak hazards, reduces installation time and costs less than an equal number of valve units.



THE KENYON COMBINATION HAND PUMP SELECTOR VALVE,

serving three to six sub-systems, incorporates a thermal relief valve and check valve in each port to protect the sub-systems from thermal expansion and excessive hand pump pressures. Installed in latest Grumman F8F "Bearcat".

- Combines Seven or More Units
- Labor Saving
- Saves Weight
- Costs Less than an equal number of valves

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OUR CUSTOMERS -- R

Our customers in the saw mill industry have definite ideas on the desirable features of the equipment they buy. They want rugged, trouble-free machines that can be set up and kept running. Hydraulic actuation has given an evenness of feed and a flexibility of speed that has given them increased production and better lumber.

By R. G. McMAHON, Manager,
Industrial Division
Northwest Marine Iron Works
Portland, Oregon
and
ELLIOTT HIGGINS, JR.
The Rucker Co.
Oakland, Calif.

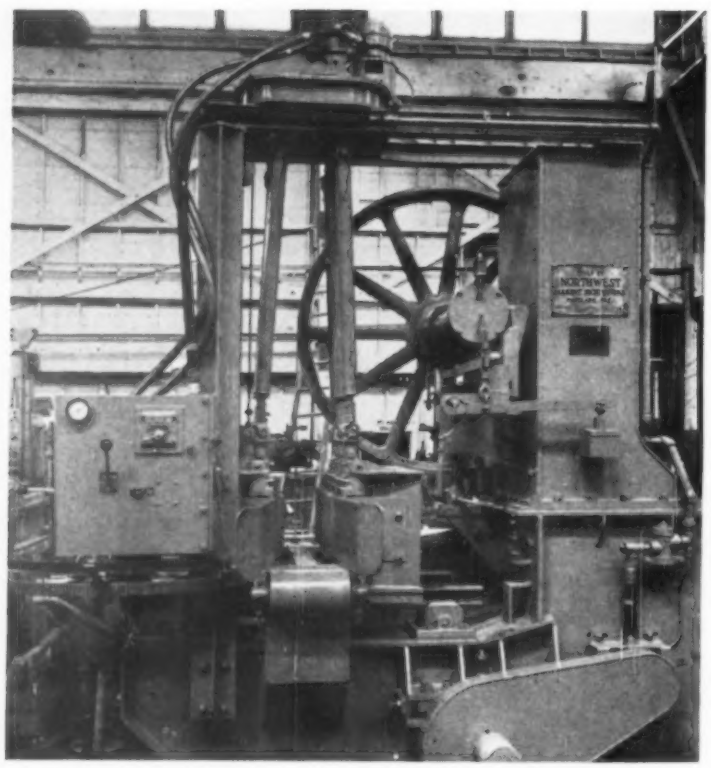


Fig. 1. A standard 66 in resaw, hydraulically actuated and controlled. The sensitivity of traditionally expert hand operation is retained by the lever and cam operation of the three 4-way valves.

THE MANUFACTURERS of machines and equipment in an old established industry are apt to discover, as we did, that their customers are their best designers. A representative sample is the actuation of feed rolls on the standard "Blue Babe" resaw, which we have built and furnished to the lumber mill industry of the Northwest for many years. The even feed, unlimited speed variation of the hydraulic drive has, in our opinion, been the most worthwhile advancement in years. We can now deliver a completely trouble-free package job to our customer's mill ready to go to work, requiring only a source of power to the main drive. Shut downs have been practically nil; customer reaction to increased production has been evidenced by a steady increase in sales.

The resaw, as the name implies, is a second operation sawing or cutting. The first slab cutting or squaring operation on logs is done on a head rig. The head rig carriage takes the log through the saw, moves it back to the starting position, resets the log for a new cut and repeats the process.

If the squared timbers or cants come from the rig, say in squares 12 in x 12 in to be cut into 1 in x 12 in boards, they are fed through the resaw, then circle around on a series of rolls for a new cut in a continuous operation. When the head rig can supply the cants fastenough to keep the resaw loaded, the mill output will be increased by a good 30 percent.

As the resaw blades are extremely thin, an additional saving is made by eliminating waste due to a wide kerf which only makes more sawdust. This saving can amount to as much as 33⅓ percent, depending on the type and thickness of the saws in use at the head rig. In other words, when a resaw is in use, the head rig is used only to square the cants as close as possible to the bark and cut to such size as the resaw can handle. For example, a 2 x 6 cant can be split with a resaw and give two 1 x 6 finished boards with no waste.

As the thin bladed resaw will cut true close to the bark, it is

R STAR DESIGNERS

Nomenclature

Burner—scrap or waste burner.
Cants—squared timbers
Dog stoner—Watchman, guard, office frontman.
Kerf—width of a saw cut, determined by the type of saw.
Resaw—machine for cutting boards from cants; second operation sawing.
Rig or head rig—machine for slab cutting or "squaring" logs for the resaw. First set of saws logs go through when they come from storage or pond.
Scarfing—out of line; cutting out of alignment.

often possible to salvage an extra piece of 2 x 6 x 10 that under ordinary circumstances would have gone to the burner.

From a log scaled at any given number of feet in the mill pond, a resaw produces more and better lumber at less labor cost than any other method of production in use.

The saw mill people, with whom we have always worked closely, have definite ideas as to the most desirable features of the equipment they buy. Prior to the application of hydraulic equipment to our 66 in resaw, our drives, installed according to customer demands, were usually in order—steam, air or electric.

At this point our troubles began. Broken down from the point of view of the type of drive, these ordinarily ran as follows:

(1) Steam: (a) Perhaps the most common difficulty was low boiler capacity due to overloaded or under-capacity plants already taxed to the utmost;

(b) Slow delivery of steam engine control valves, reducing valves, drive sprockets and roller chains;

(c) Purchase or manufacture of roll pressure cylinders.

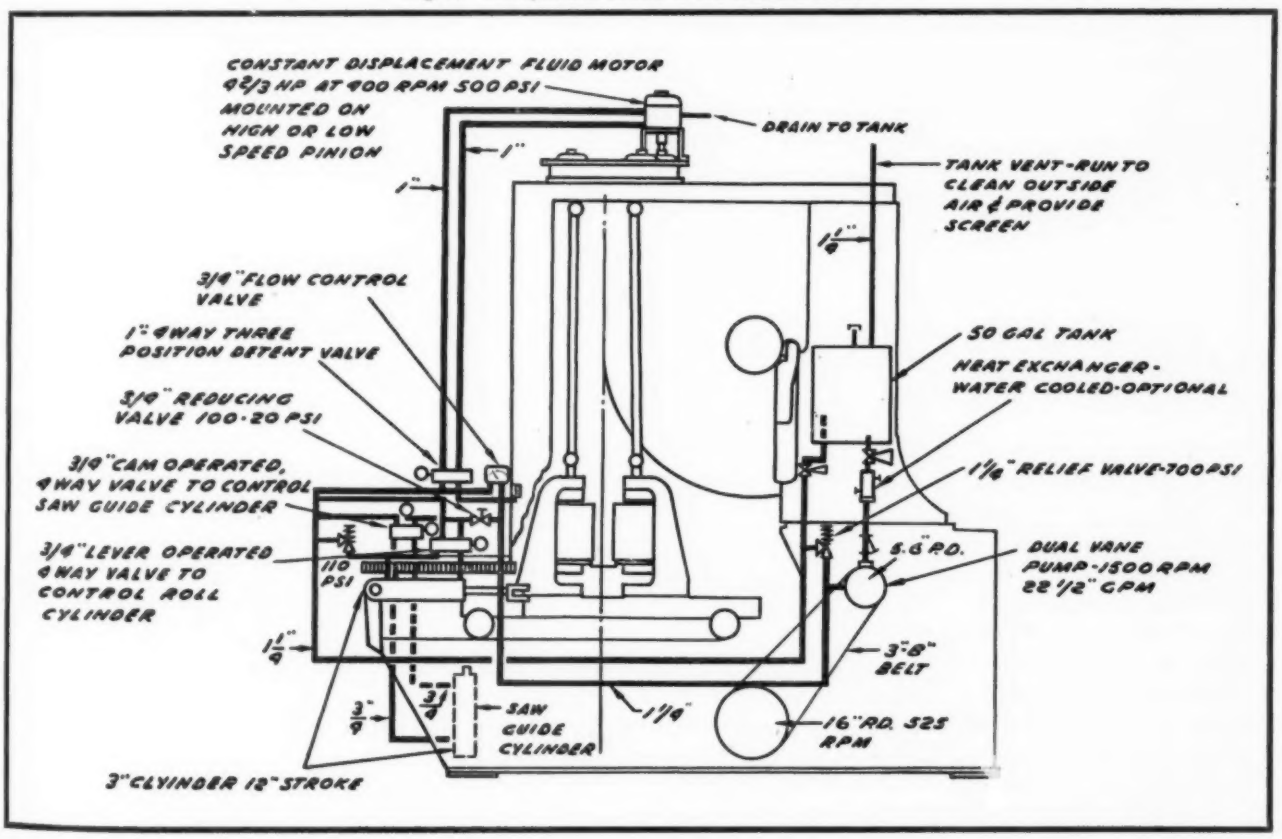
The customer might decide at this point to change to air drives and controls, necessitating a complete change over—the cost of which usually was considerable.

(2) Air: Low compressor capacity, engine and cylinder deliveries again were problems. Often too, a last minute request to change over to steam complicated machine deliveries.

(3) Electric: Lack of capacity, frequent power failures, slow equipment deliveries and lack of flexi-

(Continued on page 18)

Fig. 2. The hydraulic circuit of the standard resaw.



BASIC HYDRAULICS

(Continued from page 10)

laid in 1653 when Pascal discovered that *pressure set up in a liquid acts equally in all directions. This pressure acts at right angles to containing surfaces.* Thus in Figure 5, if the liquid standing on a square inch A at the bottom of the tank weighs 8 pounds, a pressure of 8 pounds per square inch will be exerted in every direction at A. The liquid resting on A will push equally downward and outward. But the liquid on every other square inch of the bottom surface is also pushing downward and outward in the same way, so that the pressures on different areas are in balance. At the edge of the bottom the pressures act against the wall of the tank, which everywhere must be strong enough to resist them with a force exactly equal to the push. Every square inch of the bottom of the tank also is strong enough to resist the downward pressure of the liquid resting on it. The same balance of pressures exists at every other level in the tank.

One of the consequences of Pascel's law is that the shape of the container in no way alters pressure relations. Thus in Figure 6, if the pressure due to the weight of the liquid at one point on the horizontal line H is 8 pounds per square inch, the pressure will be 8 pounds per square inch everywhere at level H in the system.

Pressure due to a liquid's weight will depend, at any level, upon the vertical height of the liquid from that level to the surface of the liquid. *The vertical distance between two horizontal levels in a liquid is known as the head of the liquid* at the lower level with respect to the higher. In Figure 6, the liquid head of all points on level H with respect to the surface is indicated.

Density and specific gravity. Pressure due to liquid head will also depend upon the density of the liquid—its weight per unit of volume. Water, for example, weighs 62.4 pounds per cubic foot or 0.036 pound per cubic inch, while a certain oil might weigh 55 pounds per cubic foot or 0.032 pound per cubic inch. It would take 222 inches of head using water to produce a pressure of 8 pounds per square inch and 252 inches using the oil (Figure 7).

The specific gravity of a substance is the ratio of the weight of a unit volume of that substance — its density — to the weight of the same volume of some standard substance, measured under standard pressure and temperature conditions. Since water is the standard used for liquids and solids, the specific gravity of the oil we have mentioned is 55/62.4 or 0.881. Volume for volume under standard conditions this oil has 881-thousandths the weight of water.

Part 1, Introduction continues in the April issue with "Pressure and Force in Hydraulic Systems" and "Hydraulic Jacks and Brakes." It is suggested that each installment be preserved for future reference.

CUSTOMERS ARE DESIGNERS

(Continued from page 17)

bility were problems that constantly confronted those who leaned toward this type of power.

In view of all this, it would certainly please us no end if we could say at this juncture that "Old Man" Hydraulics stepped into the picture, took our hot, moist, little hand in his, wiped our perspiring brow and without further ado, solved all our problems with neatness and dispatch. Unfortunately, such was not the case.

However, we did find a manufacturers' representative — the Rucker Company of Oakland, Calif., who lent a sympathetic ear; their capable representative worked very close to us throughout.

In order to bring out all phases of the problems to be met, we maintained first and foremost in mind the owner-operator needs. By drawing on our own best talent and by conferring directly with saw mill people, which meant every one from the general manager to the dog stoner at the gate, we amassed a maze of ideas. Some of these were good, some not so good, but all were useful and aimed at one specific end—higher production and better lumber.

Some of the best ideas came from the filing rooms—the accepted headquarters of the king pin of the average mill. From the head filer, who eats and sleeps with his pet saws, and whose advice as to saw speeds, blade tension, etc., is seldom, if ever disregarded, we determined the best operating speeds, roll pressure settings, capacities and other operating characteristics. This information we found to be extremely accurate as later events proved.

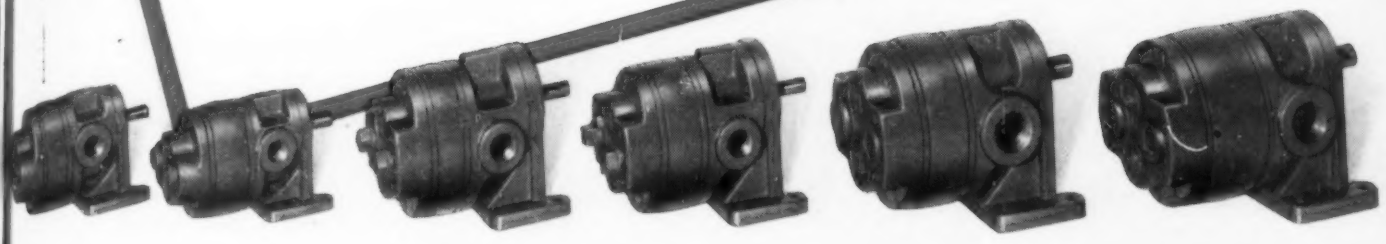
On at least two occasions we had to cut down the roll speed from the owner's original specifications by changing the roll drive gearing and working out new gear ratios, so that we were assured at all times of a steady, flexible flow of power.

Basically, the operation of the hydraulic system is simple. A dual vane pump (that delivers 22½ gpm at 1500 psi), driven from the saw arbor, supplies oil to a constant displacement fluid motor through a three way detent 4-way valve. This valve permits the pressure port to be blocked while the cylinder ports to the fluid motor are open. The six heavy cast steel fluted feed rolls are driven through a gear case and universal jointed shafts.

The system operates at low pressure, approximately 500 psi. While we understood that the maximum efficiency of both pump and fluid motor would be obtained at pressures of approximately 1500 psi, the system was a compromise in favor of the average maintenance training of the mechanics in the average mill. Many of these men are unfamiliar with high pressure piping and are much more at home with piping and

(Continued on page 20)

Wide range... right selection...



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Improve the efficiency and dependability of your hydraulic systems by selecting a pump best suited to the specific job.

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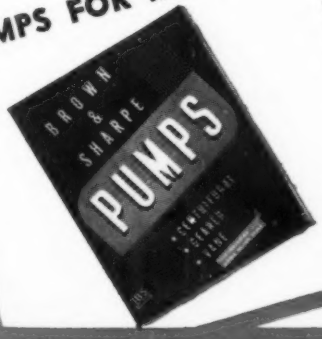

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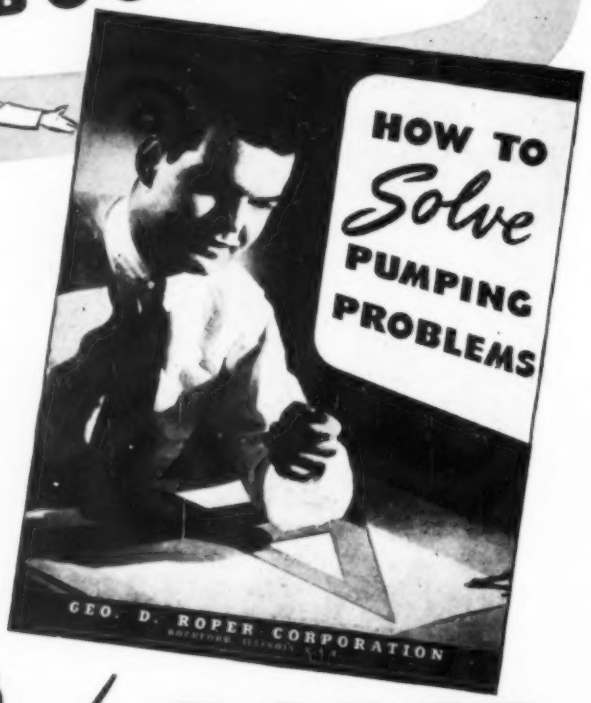

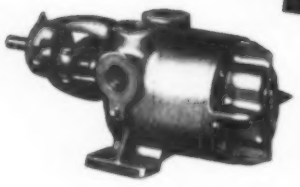

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OUR CUSTOMERS—OUR STAR DESIGNERS

(Continued from page 18)

fittings at lower pressures.

The speed of operation is controlled by a flow control valve. The pressure compensator in this valve maintains an even feed through the resaw regardless of fluctuations in pressure. This is, of course, very important.

The roll set cylinder and the saw guide cylinder are operated on a low pressure system, taken off the main line through a reducing valve. Both cylinders are 3 in bore, 12 in stroke.

The roll set cylinder is controlled by a 4-way valve in which a pressure port and one cylinder port are closed to tank and one cylinder port is open to tank in a neutral position. A low pressure relief valve is piped into the circuit in such a way that if a board of excessive thickness or if a sudden surge of pressure occurs, the oil can vent back to the tank.

The saw guide cylinder is positioned and held with a spring centered, closed center 4-way valve.

All of the controls—roll feed, speed control, roll set and saw guide — are conveniently grouped on a panel for effective one man operation.

The resaw, like all equipment in a saw mill, is subjected to rugged service. Equipment is just set in place and expected to keep running.

The real advantage of a hydraulic feed comes in the evenness of feed and the rapid variability of speed. If lumber is forced through a resaw too rapidly, the saw will waver and the boards will cut unevenly, reducing their value as lumber with a resultant loss to the mill. Some sizes of boards and some species of lumber can be sawed faster than others, depending on the moisture content and various other factors.

The hydraulically actuated resaw has met the real test—customers get increased production and better lumber.

SUNDSTRAND MACHINE TOOL COMPANY

HYDRAULIC RIGIDMILS

The Sundstrand Machine Tool Company, leading builder of milling machines, automatic lathes, centering machines, grinders and special machinery, as well as a line of hydraulic pumps, fluid motors, hydraulic transmissions and control valves, offers three Rigidmils with hydraulic table cycling and adjustable feeds. High ratio spindle head and hydraulic feeds provide ample speeds and feeds for milling a wide range of materials on any one machine.

No. 00 HYDRAULIC RIGIDMIL

General: Basic design features include automatic table cycling (6 standard cycles), infinitely adjustable feeds in a range from ½ to 37 inches per minute (1¼ to 65 inches per minute, optional), a rapid traverse rate of 400 inches per minute and wide speed range in a ratio of 42½ to 1.

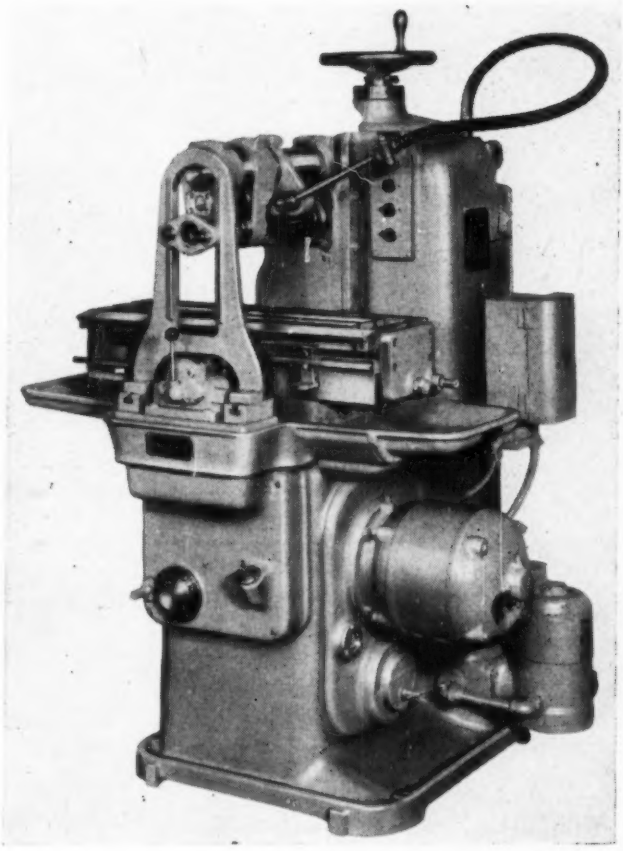
Specifications: Bulletin No. 00-1.

Hydraulic Circuit: Controls automatic table movements of rapid traverse and adjustable feed for either one or two way table cycles.

Attachments Available: Vertical spindle head, automatic spindle stop, accurate table stop (electric dwell, reverse table within limits plus or minus .001), coolant pump and automatic index base, all extra. Bulletin No. 00-1.

Operation and Maintenance: Instructions for Installation, Operation and Maintenance—Bulletin No. 00-2.

Parts List: Parts List and Assembly Drawings—Bulletin No. 00-3.



Copies of any of the Rigidmil Bulletins listed on these pages are available from Sundstrand Machine Tool Co., 2531 Eleventh St., Rockford, Ill.

All Sundstrand machines, attachments and accessories are protected by issued and pending United States and foreign patents.

SUNDSTRAND MACHINE TOOL COMPANY

No. 0 HYDRAULIC RIGIDMIL

General: This machine can be furnished in either a simplex (standard) or duplex model. It has automatic table cycling (6 standard cycles), infinitely adjustable feeds in a range from ½ to 38 ipm (1¼ to 67 ipm, optional), a rapid traverse rate of 325 ipm and wide speed range in a ratio of 48 to 1.

Specifications: Bulletin No. 0-1.

Hydraulic Circuit: Controls automatic table movements of rapid traverse and adjustable feed for either one or two way table cycles.

Attachments Available: Same as No. 00 Rigidmil; auxiliary hydraulic pump, cylinders and piping for operating fixture clamps. Bulletins No. 0-1 and No. 0-D-1.

Operation and Maintenance: Instruction for Installation, Operation and Maintenance—Bulletin No. 0-3. Edition Three.

Parts List: Parts List and Assembly Drawings—Bulletin No. 0-3. Edition Four.

No. 1 RIGIDMIL

General: Principal features include automatic table cycling (6 standard cycles), infinitely adjustable feeds in a range of ½ to 31 ipm 1¼ to 55 ipm, optional), a rapid traverse rate of 345 ipm and wide speed range in a ratio of 60 to 1.

Specifications: Bulletin No. 1-1.

Hydraulic Circuit: Controls automatic table movements of rapid traverse and adjustable feed for either one or two way table cycles.

Attachments Available: Same as No. 00 Rigidmil. Bulletin No. 1-1.

Operation and Maintenance: Instructions for Installation, Operation and Maintenance—Bulletin No. 1-3. Edition Four.

Parts List: Parts List and Assembly Drawings—Bulletin No. 1-3. Edition Four.

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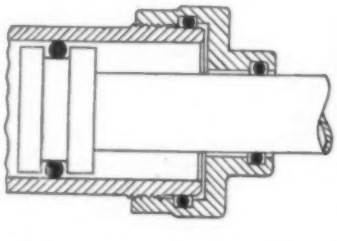

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New PRODUCTS

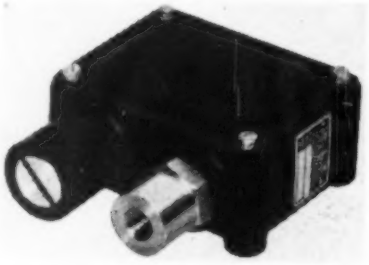
For additional information on any of these products, mark the end key numbers on the card bound in this issue and mail the card.

Check Valve

A radically new hydraulic check valve, recently developed by Greer Hydraulics, Inc., is now available for industrial pressure flow applications. The valve, model DSK 638, incorporates an entirely new feature—the sealing action is obtained from a synthetic rubber "O" ring seal. This new valve is of the poppet type, with the poppet housed in a steel housing and spring opposed against back flow. When the fluid flow is correct, the poppet opens and the pressure and flow are unrestricted. This design features full flow of fluid, extremely low pressure drop and positive seal against leakage. Use Business Reply Card, mark NP-1.

Pressure Switch

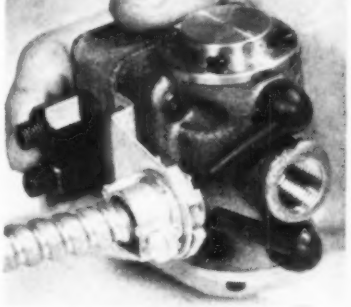
A new moisture proof, explosion resistant pressure switch for ac or dc operation has been developed by Saval, Inc. It is



recommended for use as a safety control on pumps, automatic hydraulic machines and presses. Actuating pressure may be set externally and locked with a minimum of effort. Six pressure ranges are offered from 50 to 10,000 psi, for water, air or oil pressure service. The hydraulic connection is tapped with a ¼ in pipe thread; switch housing which may be mounted in any position is drilled for ½ in conduit connection. Use Business Reply Card, mark NP-2.

Air Control Valve

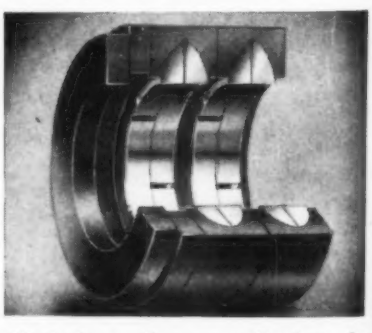
A new solenoid-actuated, air control valve which uses the same air for control that it uses for operation, has just been announced by The Bellows Company. Designed for operation



on air lines with working pressures from 5 to 150 psi, this valve incorporates a lightweight piston for directional flow control through the 4-way shear-flow ports and uses 8 volt air-cooled solenoids for operation. It is immediately available in ¼ and ⅜ in ports complete with special transformer. Use Business Reply Card, mark NP-3.

Hydraulic Packing

A new multiple duty metallic packing is announced by Hydraulic Accessories Company. Developed to permit standardization of maintenance, they



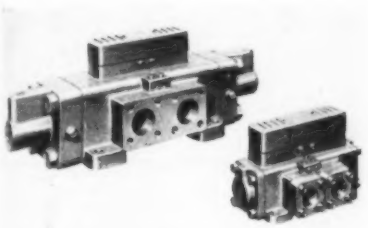
will help reduce confusing inventories of single-duty packings. The packings are recom-

mended for use on hydraulic machine tools, pumps, compressors, accumulators and cylinders — equipment requiring a seal against air, oil or water under pressures to 3000 psi.

Sizes range from ½ in ID to 36 in OD. Use Business Reply Card, mark NP-4.

Directional Control Valves

The new series DG solenoid controlled 2, 3 and 4-way directional control valves are announced by Vickers Incorporated. Features include compactness, small solenoids, low inrush and holding current and open, closed and partially blocked valving modifications. Such modifications and "sandwich" type construction provide adaptability to meet nearly all directional control requirements. With maximum operating pressure of 2000 psi, the series DG valves are available for piping sizes ⅛ in to 1¼ in, in either gasket or sub-plate mounting. Models with flange connections are available for piping sizes 1½, 2½ and 3 in. Use Business Reply Card, mark NP-5.



Dual-Purpose Oil

The Sun Oil Company announces "Lubeway", a new dual-purpose oil for use in hydraulically operated machine tools that pressure-feed way lubricant from the hydraulic system. Designed for a leading machine tool manufacturer to overcome chattering of the table and excessive wear on the ways, the new oil incorporates the stability and non-sludging characteristics of a good hydraulic oil and the metal-wetting and extreme pressure qualities of a good way lubricant. Lubeway is available in 150 and 300 viscosities. Use Business Reply Card, mark NP-6.

INCREASE THE SERVICE LIFE

OF YOUR HYDRAULIC CIRCUIT COMPONENTS

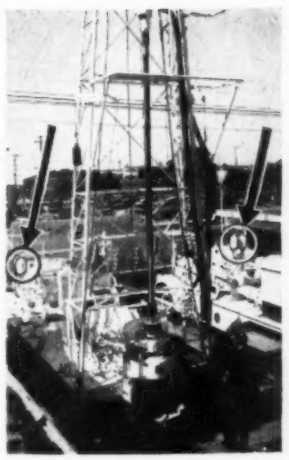
with a GREER ACCUMULATOR

The heart of your hydraulic circuit is the power pump. And like the action of the human heart, the pump sets up pulsations and pressure surges which unless eliminated will cause serious damage to and failure of the pump, pipe lines, valves, bearings, gears and fittings.

The Greer Accumulator provides the simplest and most effective device to smooth out pressure surges and dampen pulsations. Furthermore, the accumulator provides greater operation economy by lengthening the service life of circuit components and eliminating costly repairs.

In addition to the applications illustrated here, the accumulator is ideally suited for boiler feed pumping systems, pressure unloading circuits and hundreds of other similar circuits using hydraulic power.

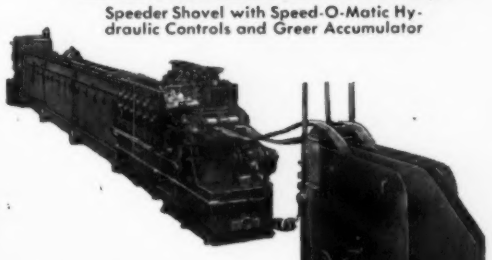
The complete story is covered in our booklet "Accumulators For Fluid Power", free for the asking, write for your copy now!



Oil Drilling Rig

Speeder Shovel with Speed-O-Matic Hydraulic Controls and Greer Accumulator

SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES



"Flying Cut-Off" Sheer and Greer Accumulator

YOUR SYMBOL OF SERVICE

GREER

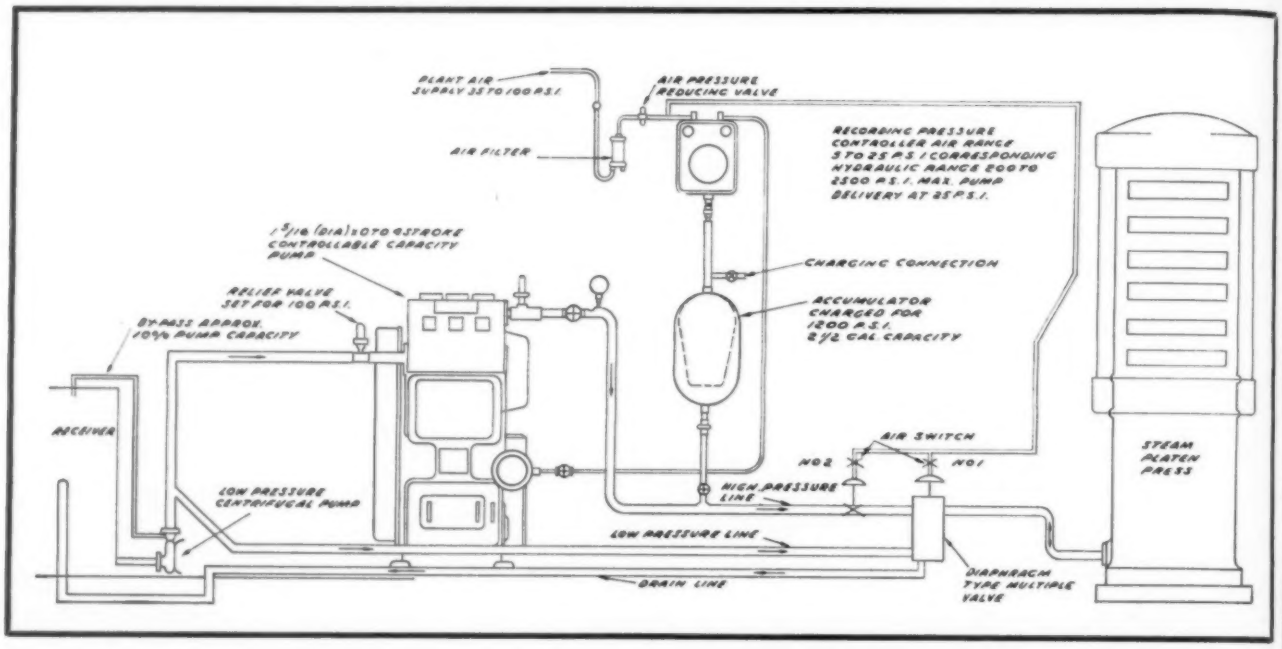
HYDRAULICS INC.

454 EIGHTEENTH ST., BROOKLYN 15, N. Y.

PAPER LAMINATES
(Continued from page 12)

With the controllable capacity pump, the length of the plunger stroke and volume of fluid delivery is adjusted automatically, from zero to full stroke. Once the exact pressure for a given job has been determined, the variable stroke delivers the correct rate of fluid. The pressure requirements for various materials can be varied and adjusted automatically through a recording pressure controller with an adjustable range from 0 to 3000 psi.

Fig. 1. Diagram of low and high pressure hydraulic system for semi-automatic operation of a steam platen press.


PLANT AIR SUPPLY 35 TO 100 P.S.I.
AIR PRESSURE REDUCING VALVE
AIR FILTER
RECORDING PRESSURE CONTROLLER AIR RANGE 3 TO 25 P.S.I. CORRESPONDING HYDRAULIC RANGE 200 TO 2500 P.S.I. MAX. PUMP DELIVERY AT 25 P.S.I.
1 5/16 (DIA.) x 0 TO 0.3 STROKE CONTROLLABLE CAPACITY PUMP
CHARGING CONNECTION
RELIEF VALVE SET FOR 100 P.S.I.
BY-PASS APPROX. 10% PUMP CAPACITY
ACCUMULATOR CHARGED FOR 1200 P.S.I. 2 1/2 GAL CAPACITY
RECEIVER
AIR SWITCH
NO2
NO1
STEAM PLATEN PRESS
LOW PRESSURE CENTRIFUGAL PUMP
HIGH PRESSURE LINE
LOW PRESSURE LINE
DRAIN LINE
DIAPHRAGM TYPE MULTIPLE VALVE

FOR USE ON SYSTEMS REQUIRING MAINTENANCE OF CONSTANT PRESSURE...

MELETRON

MULTI CIRCUIT PRESSURE ACTUATED SWITCH

Model No. 380

Here is the last word in pressure actuated switches consisting of 2 independently adjustable switch elements. Skeleton type. So designed as to be mounted in control cabinet. Sturdily and precision built. Long life guaranteed. Bourdon tubes available in varying wall thicknesses according to working pressures. Write for full details. This switch is also available in cast aluminum housing. Write for literature on Model No. 370.

MELETRON CORP.
950 NORTH HIGHLAND AVENUE
LOS ANGELES 38, CALIFORNIA

ENGINEERS AND MFRS. OF PRESSURE ACTUATED SWITCHES.

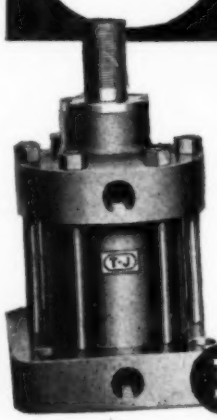
For ANY job that requires

LIFT

PULL

PUSH

You can SAVE LABOR *with* T-J CYLINDERS



Why waste labor on "muscle jobs" of pushing, pulling, lifting or control operations? T-J Cylinders will do it *automatically... with accuracy...* and *cut costs!*

For 100 lb. or 50,000 lb., there's a T-J Air or Hydraulic Cylinder that's *right* for your requirements. Many standard sizes and styles... both cushioned and non-cushioned types. Precision-built... backed by 31 years of know-how... dependable. Write for catalogs. The Tomkins-Johnson Co., Jackson, Michigan.

TOMKINS-JOHNSON T-J
RIVITORS . AIR AND HYDRAULIC CYLINDERS . CUTTERS . CLINCHORS

The controller rides on the bi-pressure discharge line and is protected from shock by a 2½ gallon bag-type accumulator which is previously charged with oil pump nitrogen. This is accomplished without requiring any change in speed of the pump motor, turbine or other prime mover. With this design, the power consumed by the pump is very nearly proportional to the rate of output, giving a very desirable savings in power.

The accompanying diagram, Figure 1, shows the schematic circuit for the phenolic laminate job.

The centrifugal pump is started by means of a magnetic starter and delivers fluid through the air operated valve to close the press on the work at low pressure (80 psi). Then the high pressure controllable capacity pump is opened through the air operated valve to apply the laminating pressure. The bladder-type accumulator is in the high pressure line and acts to give an initial impulse to the fluid in the ram supply line as the valve is opened. This serves to level out the surge of pressure from the high pressure pump.

Air Switch Control

The controls for this installation are two air switches which control the two air-top valves shown in the diagram.

The first air switch (number 1 on the diagram) applies the low pressure on the press ram through the diaphragm type full area multiple valve. When the press is closed, the second air switch, number 2, is opened, automatically closing the multiple valve to the low pressure pump and applying the high pressure to the ram.

When air switch number 1 is thrown closed, the multiple valve connects the drain line to the ram, and the weight of the ram forces the water to the storage tank.

The flexibility of this equipment has led to other types of laminating jobs. One interesting class of work experimented with has been the use of maps or photographs as a top layer (protected by an outer transparent plastic sheet) in laminating decorative sheets suitable for the finest home. The process is somewhat similar to the special laminates used as interior panelling in a town-and-country model of a leading automobile, where photographic reproductions of wood grains, velours, leathers and carpeting were used very successfully.

The use of two stage centrifugal and variable stroke pumps has made it possible to do a much greater range of jobs on the laminating press so equipped. Customer acceptance indicates that photographic reproductions of all kinds will increase in favor. The flexibility, accurate, continuous fluid pressure delivery and the simplicity of control has multiplied the usefulness and increased the rate of dollar return with this equipment.

NOW!

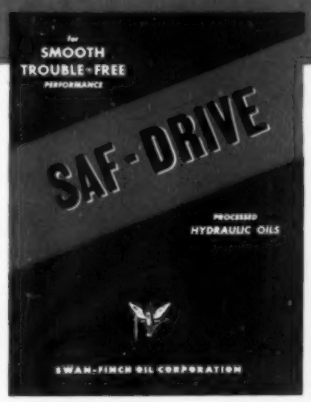
GET MAXIMUM HYDRAULIC CIRCUIT EFFICIENCY WITH NEW SAF-DRIVE HYDRAULIC OILS

...these service properties mean trouble-free performance

- High oxidation stability
- High lubrication value
- High rate of water separation
- High viscosity indices
- High resistance to corrosion and rust

After extensive research development plus actual service tests, Swan-Finch announces its new series of hydraulic fluids, designed specifically to meet the stringent demands of modern hydraulic circuits.

The SAF-DRIVE Series is composed of the finest solvent extracted oil stocks, chemically processed with organic additives for maximum oxidation stability, lubrication value and corrosion and rust preventative qualities.



...JUST OUT

Bulletin on SAF-DRIVE Series

Write for your free copy of this new bulletin. It contains detailed data on the new Swan-Finch hydraulic oils and tells why SAF-DRIVE means smooth, trouble-free performance, longer life for your equipment.

SWAN-FINCH OIL CORPORATION
RCA BUILDING WEST • NEW YORK 20, N. Y.

5329

HYDRAULIC ENEMY No.1 UNCLEAN OIL

ARREST HIM WITH **MARVEL SYNCLINAL FILTERS**

always on the job protecting hydraulic production equipment.

2½ TIMES MORE FILTERING AREA THAN EQUIVALENT SIZE CIRCULAR TYPE FILTERS

This means maximum filtration in less space. Standard 100 mesh (.0050 opening) insert—others range from course 30 mesh to fine 200 mesh inserts. Adaptable to meet any filtering problem.

SUMP TYPE IN 6 CAPACITY SIZES—4 PIPE SIZES

—50, 30, 20, 10, 8, or 5 GAL. per minute. Increased capacity easily obtainable with manifold installations.

Write for Catalog No. 103 containing complete engineering data.

MARVEL ENGINEERING COMPANY

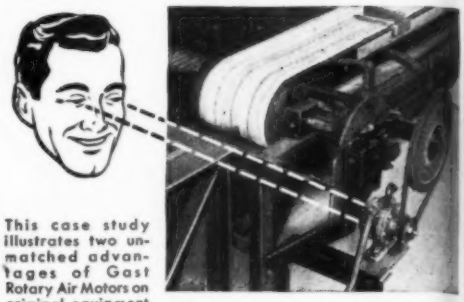
625 W. Jackson Blvd., Dept. 55, Chicago, Illinois

PROBLEM: Drive a conveyor-belt carrying fragile material so that belt speed drops when drag of load increases.

SOLUTION: A Gast Air Motor maintains constant tension on material in process despite varying drag of load and belt r.p.m.

RESULT: This variable-speed drive reduces material spoilage—saves money.

UNUSUAL CONVEYOR-BELT PROBLEM solved with a variable-speed GAST AIR MOTOR



WRITE TODAY! Request your copy of GAST'S IDEA-CATALOG

This case study illustrates two unmatched advantages of Gast Rotary Air Motors on original equipment applications. More advantages:

AIR MOTORS CAN'T BURN OUT—It's possible to stall them—but they can't burn out!

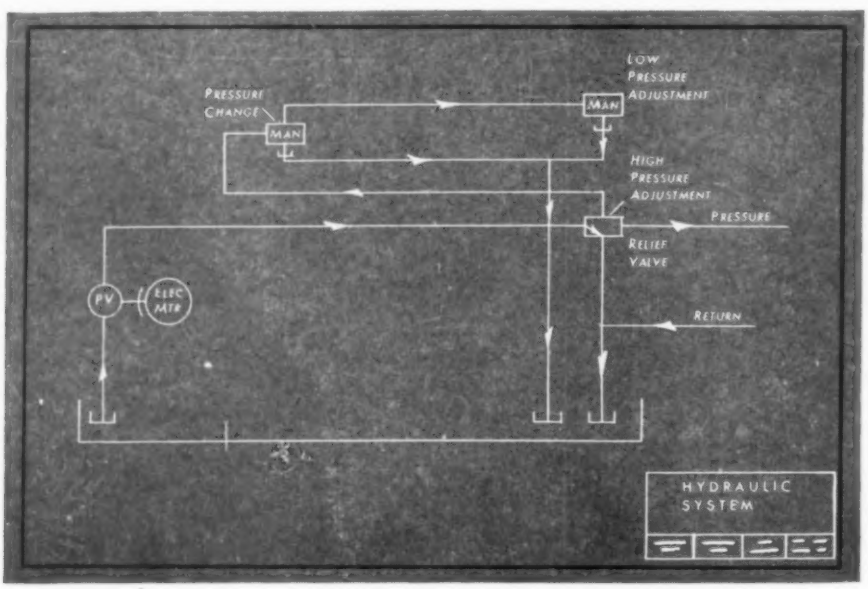
CAN'T SPARK EXPLOSIONS—No sparks—Gast Motors are explosion-proof.

GIVE VARIABLE R.P.M.—Controlled speed from 100 to 2,000—some to 6,000 r.p.m.

In many other ways, Gast Air Motors offer more—at less cost. Investigate now. *"Air may be your Answer!"*

GAST ROTARY AIR MOTORS · COMPRESSORS · VACUUM PUMPS
(TO ONE H.P.) (TO 30 LBS.) (TO 28 INCHES)

GAST MANUFACTURING CORP. 131 Hinkley St., Benton Harbor, Mich.



The Superior Tube Company has made a specialty of producing seamless steel tubing for use in hydraulic and other types of pressure systems. For pressure loads above 200 psi, Superior Tubing is cold drawn to meet the following hydraulic tubing specifications—

J. I. C. Hydraulic Standards; AMS 5050-B.

By selection of raw materials, the steel used is of a *non-aging type* made under special melting practice to insure low yield strength and unusually high elongation. Superior hydraulic tubing is given a *100% hydrostatic test*, and, in addition, is tested for *flareability*. The tubing is soft and ductile and remains soft for bending and flaring.

Standard sizes are available for prompt delivery from Superior representative-warehouses. We invite your request for further information.

For Superior tubing on the West Coast, call PACIFIC TUBE COMPANY, 5710 Smithway Street, Los Angeles 22, California, ANgelus 2-2151

Superior

THE BIG NAME IN SMALL TUBING (.010" TO 5/8" O.D. inc.)

SUPERIOR TUBE COMPANY

2038 Germantown Avenue Norristown, Pa.

Let it vibrate... Let it flex...

The B. M. Root Company of York, Pa., makers of this Multiple Spindle Hydraulic Feed Wood Boring Machine, depend on Resistoflex hose for enduring performance of hydraulically operated clamps.

You needn't ever worry about feed-line fatigue as long as RESISTOFLEX hose is transmitting your hydraulic power. For RESISTOFLEX has *flexibility* and *fatigue resistance* to absorb continuous vibration—plus uniform, reinforced construction to withstand shock loads. On the above machine, for example, RESISTOFLEX hose assemblies sustain up to *60 load applications per minute!*

RESISTOFLEX hose is impervious to oils and hydraulic fluids because *compar*, of which its tube is made, is permanently unaffected by them. You can forget about clogging of mechanisms due to erosion—about impeded flow due to swollen hose.

If you have a problem in circulating anhydrous fluids, gases, or oils, get acquainted with the long-lasting, low-cost performance of RESISTOFLEX hose assemblies. Write today for details.

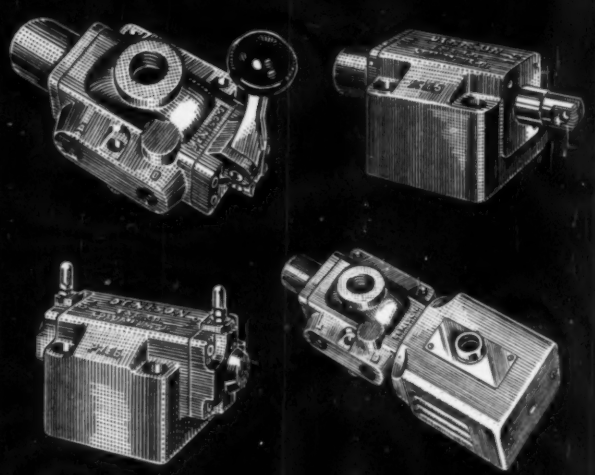
RESISTOFLEX
CORPORATION

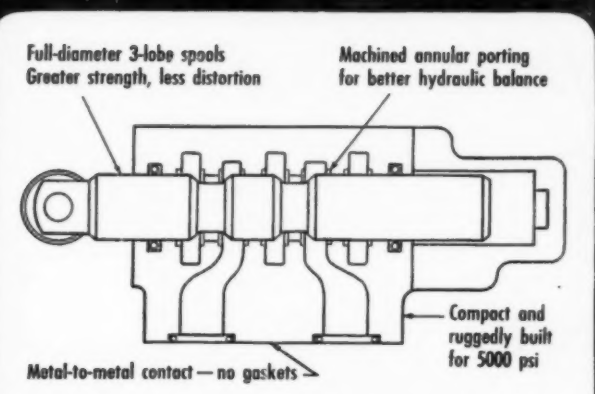
Belleville 9, New Jersey

FLEXIBLE HYDRAULIC, OIL, GAS, VACUUM AND REFRIGERANT LINES. COUPLINGS AND FITTINGS

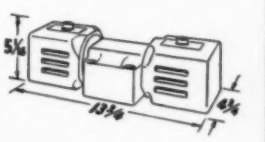
LONGER SERVICE
is built into DENISON hydraulic 4-way VALVES

Provided in two types — either threaded or subplate
Complete range of pipe sizes — from 1/4" to 1 1/2"





COMPACTNESS:
Check dimensions of the Denison 3/4" double-solenoid valve shown at right, with those you are now using.



COMPARE:
Denison Valves with *any* valves on the market today. Compare them for space-saving size: lasting efficiency; modern, rugged construction; low cost. Send for bulletins VD-1 and VD-2 without delay!

The DENISON Engineering Co.
1166 Dublin Road Columbus 16, Ohio

DENISON EQUIPMENT for APPLIED HydrOILics

Problem:
to cut down on
pump failures in
moving fluids.

Solution:
Specify long-life,
dependable pumps
by Eastern

Built to stand the gaff of long, multiple-cycle non-lubricating liquid pumping, Eastern GW Series Pumps operate efficiently and economically. They're quiet, consume little power and deliver uniform performance day in and day out.

The Eastern GW Series is precision-built in two sizes: GW-1, rated at ½ G.P.M. and GW-2, rated at 1 G.P.M. — against pressures up to 200 P.S.I. — plenty of pumping power and volume for normal liquid transfer applications.

CHECK THESE FEATURES

Stainless steel drive gear; graphite carbon composition driven gear; no metal-to-metal contact; graphite impregnated bearing; hydraulically balanced; lifetime stuffing box mechanical seal; tough bronze construction.

You can get immediate deliveries on both Eastern GW Series Pumps. They are supplied with 1/6 or 1/4 H.P. motors; belt driven or flexible coupling driven units are also available.

WRITE FOR FULL DETAILS

Eastern
INDUSTRIES, INC.
298 ELM STREET
NEW HAVEN 6, CONN.

Useful Literature

The publications listed are available without charge. Mark the initial key number on the card bound in this issue and mail.

25. Hydraulic Cylinders . . . A new hydraulic cylinder catalog, Section No. 103, has been published by Gerotor May Corporation. Eight mounting styles are shown with bore specifications from 2 to 10 in. Cushioned cylinders in each model are offered. Mountings are listed with both male and female rods. Complete diagrams and engineering data including disbursements and theoretical forces for both standard and 2 to 1 rod are included in this 20 page catalog.

26. Leather Packings . . . The Sirvis mechanical leather packings produced by Chicago Rawhide Manufacturing Company are described in a general catalog available from this company. Braided, rawhide packing in containers or cut to length and U, flange, cup and vee leather packings are offered in a wide range of outside diameters and heights to 2 in.

27. Hydraulic Valves . . . Bulletin L-43, issued by Hydropress, Inc. lists the valves made by this company. Valves are custom built to meet exacting and rigid requirements. Valves for manual operation or by remote control, including servo motor, are furnished. Combinations of valves for sequence operation are shown. Sectional drawings of principal types of valves show distinctive construction details.

28. Hydraulic Gauges . . . Bulletin 230-A describes and illustrates the hydraulic gauges manufactured by The Watson-Stillman Co. The gauges are made in two types—beaded for direct stem mounting and flanged for flush mounting on panel or gauge board. The flush mounted type is made in five dial sizes for pressures to 10,000 psi and the direct stem mounted type in four dial sizes for pressures from 1000 to 30,000 psi.

THE MARKET PLACE
CLASSIFIED ADVERTISING

Rates for "Positions Wanted" $3.00 minimum for 25 words, each additional word 10c; boldface type or all capitals, $7.50 minimum for 25 words, minimum, limit 25 words. For all other classifications, each additional word 15c; limit 50 words. Box addresses count as five words. All insertions are payable in advance.

These classified columns are not intended for the advertising of new products by manufacturers, their representatives, or their distributors. These columns are limited to Help Wanted or Positions Wanted Ads, and offering of used equipment by the users of such equipment.

LINES WANTED

Manufacturers' representative covering New England territory specializing in hydraulic equipment desires additional and allied lines location Central New England. Address Box 3149, Applied Hydraulics.

FOR SALE

60 Romec hydraulic pumps 2.5 GPM at 200 PSI #RD-5640. Also 60 Rotec ¼" relief valves #RB-6620-A. Write Champion Dish Washing Machine Company, Erie, Pennsylvania.

WANTED

Experienced HYDRAULIC PRESS DESIGNERS. State age, experience, desired salary. French Oil Mill Machinery Company, Piqua, Ohio.

THE METAL BEST SUITED TO EACH OF YOUR PARTS

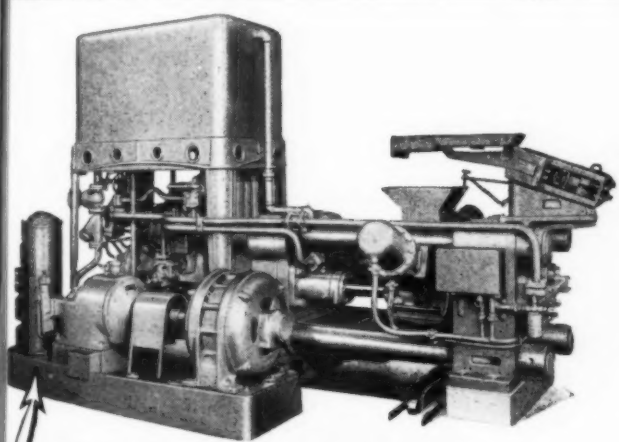
IS YOURS IN

PROMET
THE Engineered BRONZE

THRUST PLATES
•
BEARING PLATES
•
SEALS
•
CONNECTING RODS
•

Regardless of size or quantity, let us make recommendations on your requirements — best locations for oil grooves, etc. Write today, sending blue prints, conditions of operation and other data.

THE AMERICAN CRUCIBLE PRODUCTS CO.
1303 OBERLIN AVE. LORAIN, OHIO



MILWAUKEE FOUNDRY Specifies
Honan-Crane for Hydraulic Oils

On the hydraulic briquetting presses produced by Milwaukee Foundry Equipment Company, Honan-Crane oil purifiers are specified for continuous purification of hydraulic oils.

Complete and satisfactory protection of pumps and precision parts of hydraulic system is assured by continuous purification. Press maintenance and down time due to dirty oil is eliminated.

For full information on low cost purification and maintenance of hydraulic oils, write to Honan-Crane Corp., 102 Wabash Ave., Lebanon, Indiana, subsidiary of Houdaille-Hershey Corporation.

CLEAN OIL ENGINEERING

ASCO Solenoid VALVES

Effective Automatic Control for Cylinders and Power Heads

It's versatile, this ASCO 3-way Solenoid Valve, for it can be found controlling air and hydraulic cylinders on hundreds of different machines, including:

air, gas and refrigerating compressors (for unloading)
tire moulding machines
plastic moulding presses
furnace and oven doors
conveyors of many types
metal working presses

Being "packless," maintenance is negligible. The stainless steel seats and discs (up to ⅜" size) are beveled, tight-seating and renewable. Pipe sizes range from ⅛" to ½"; port sizes from ⅛" to ⅜". It's suitable for pressures up to 500 pounds and temperatures up to 212° F. Other ASCO 3-way Valves up to 4" pipe size available.

This ASCO Solenoid Valve (Bulletin 8300) and its many companions in the broad ASCO Line are backed by more than 60 years of experience in the design and manufacture of automatic control units. This is your assurance of (1) getting the correct solenoid valve for your control problem and (2) getting a reliable valve.

ASCO Solenoid VALVES

When in need of Automatic Transfer Switches, Remote Control Switches, Contactors, Relays, and Specialized Electromagnetic Controls, come to us.

Automatic Switch Co.
LAKESIDE AVENUE • ORANGE, NEW JERSEY

POST SCRIPTS OF INDUSTRY

NEWS · VIEWS · TRENDS

Mead Specialties Co., Chicago, Ill., has named R. M. Wright Co., 7401 Du Bois St., Detroit, as Michigan representative and Jackson-Walter Co., 210 N. 13th St., Philadelphia, as representatives in eastern Pennsylvania, lower New Jersey, Delaware and Maryland.

American Flexible Coupling Co., Erie, Pa., has appointed Ehret & Kinsey, 327 S. LaSalle St., Chicago as sales and engineering representatives.

Richard Hayman, general manager of Haskell Engineering and Supply Co., Glendale, Calif., announces the appointment of his organization as industrial representative for southern California by Saval, Inc., Los Angeles. Haskel will handle Saval's well-known line of high pressure "Shear-Seal" valves for industrial applications. This addition gives Haskel a most complete service on hydraulic and pneumatic equipment and accessories.

Hall Kirkham, president, Hydraulic Equipment Co., Cleveland, Ohio, announces the election of Edward J. Hrdlicka to vice president of the company. Hrdlicka has been with the company for over 12 years and has served in various capacities, more recently as chief engineer and vice president in charge of engineering. He succeeds Harold J. Zimmerman, who resigned to re-enter the field of industrial engineering as an independent operator.

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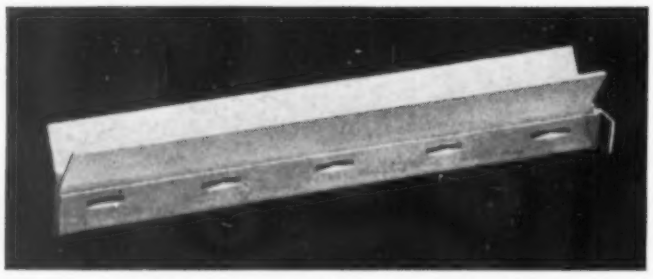
VISTEX RESISTS HYDRAULIC FLUIDS

(including tricresyl phosphate)



Vistex wiper used in an air filter employing tricresyl phosphate; life, 1 to 4 years, depending upon type of dust.

If you are designing improved hydraulic equipment write for information about Vistex, American Felt Company's special material for packings, washers, heavy-duty bearing seals, gaskets, wipers and the like. Vistex is a high-grade wool felt thoroughly impregnated with a special synthetic. It is strong, tough, self-lubricating, highly resistant to wear, and by proper choice of the impregnating substance can be made to resist the attack of any hydraulic fluid now used, including tricresyl phosphate. Here is the answer to long-lasting leak-proofing. For illustrative samples and full technical information, write for Data Sheet No. 14, "Vistex"

American Felt Company

TRADE MARK

GENERAL OFFICES: GLENVILLE, CONN.

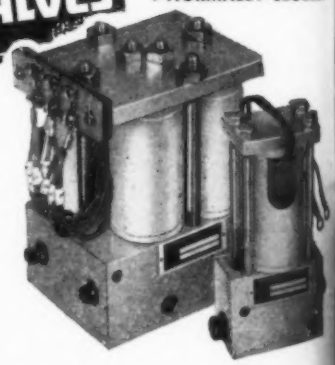
Engineering and Research Laboratories: Glenville, Conn. PLANTS: Glenville, Conn.; Franklin, Mass.; Newburgh, N. Y.; Detroit, Mich.; Westerly, R. I. SALES OFFICES: New York, Boston, Chicago, Detroit, Cleveland, Rochester, Philadelphia, St. Louis, Atlanta, Dallas, San Francisco, Los Angeles, Portland, Seattle, Montreal.

NEW HIGH PRESSURE SOLENOID VALVES

- TWO-WAY
- THREE-WAY
- FOUR-WAY
- NORMALLY-OPEN
- NORMALLY-CLOSED

Features

- Rugged Compact Construction
- 3000 psi operating pressure
- May be mounted in any position
- Poppet design eliminates leakage
- Low current consumption
- Impregnated coils resist moisture and condensation



Waterman High Pressure Solenoid Valves are compact units that provide controls for hydraulic systems with pressures as high as 3000 psi. Poppet type construction eliminates leakage thereby making them ideal for clamping and holding cylinders or any other hydraulic application where internal leakage cannot be tolerated.

Available in ¼" and ⅜" pipe size—any voltage from 6 to 36 volts D.C.

WATERMAN ENGINEERING Company

721 CUSTER AVENUE • EVANSTON, ILLINOIS